WHAT IS CLAIMED IS:

1. A method of making a filter media, said method comprising the steps of:

measuring a diffusion rate of a first analyte into a first polymer using an optical planar waveguide interferometer; and

if the diffusion rate of the first analyte into the first polymer as measured by the optical planar waveguide interferometer is greater than or equal to a desired diffusion rate value, incorporating the first polymer into an absorptive system of a filter media.

2. The method of Claim 1, further comprising the steps of:

if the diffusion rate of the first analyte into the first polymer as measured by the optical planar waveguide interferometer is less than the desired diffusion rate value,

measuring a diffusion rate of the first analyte into each polymer within a group of additional polymers comprising at least one polymer other than the first polymer using an optical planar waveguide interferometer;

if the diffusion rate of the first analyte into a second polymer within the group of additional polymers is greater than or equal to the desired diffusion rate value as measured by the optical planar waveguide interferometer, incorporating the second polymer into the absorptive system of a filter media.

3. The method of Claim 1, wherein the desired diffusion rate value is greater than or equal to 10^{-8} cm^2/sec.

4. The method of Claim 1, further comprising:

measuring a glass transition temperature, T_g, of the first polymer; and

if (i) the diffusion rate of the first analyte into the first polymer is greater than or equal to a desired diffusion rate value and (ii)

the T_g of the first polymer is less than or equal to a desired T_g value, incorporating the first polymer into the absorptive system of a filter media.

5. The method of Claim 4, wherein the desired diffusion rate value is greater than or equal to 10^{-8} cm^2/sec, and the desired T_g value is less than or equal to about 20°C.

6. The method of Claim 1, wherein the absorptive system of the filter media comprises at least one polymer having a diffusion rate of the first analyte into the at least one polymer as measured by the optical planar waveguide interferometer of greater than or equal to the desired diffusion rate value.

7. The method of Claim 6, wherein the absorptive system of the filter media comprises at least one additional polymer in combination with the at least one polymer having a diffusion rate of the first analyte into the at least one polymer as measured by the optical planar waveguide interferometer of greater than or equal to the desired diffusion rate value.

8. The method of Claim 1, further comprising the steps of:

incorporating one or more reactive additives into the absorptive system of the filter media.

9. The method of Claim 8, wherein the one or more reactive additives comprises reactive nanoparticles.

10. The method of Claim 1, wherein the step of measuring the diffusion rate of a first analyte into a first polymer using an optical planar waveguide interferometer comprises:

measuring a phase change in a sensing beam of light relative to a reference beam of light; and

determining the diffusion rate of the first analyte into the first polymer from the phase change.

11. The method of Claim 10, wherein the step of measuring a phase change in a sensing beam of light relative to a reference beam of light comprises:

optically combining a first propagating light speed of the sensing beam of light with a second propagating light speed of the reference beam of light to create an interference pattern of alternating dark and light fringes;

imaging the interference pattern via a two-dimensional array detector to produce a signal output;

converting the signal output to a phase change output using a Fourier transform program.

12. A filter media formed from the method of Claim 1.

13. A method of removing one or more volatile or semi-volatile compounds from a fluid stream, said method comprising:

bringing the fluid stream and the filter media formed from the method of Claim 1 into contact with one another.

14. A method for measuring a diffusion rate of a first analyte into a first polymer, said method comprising:

positioning a test sample of the first polymer within a test sample region of an optical waveguide interferometer;

positioning a reference sample of the first polymer within a reference sample region of the optical waveguide interferometer;

passing a first beam of light though the test sample region to produce a sensing beam of light exiting the optical waveguide interferometer while simultaneously passing a second beam of light through the reference sample region to produce a reference beam of light exiting the optical waveguide interferometer;

optically combining a first propagating light speed of the sensing beam of light with a second propagating light speed of the

reference beam of light to create an interference pattern of alternating dark and light fringes;

imaging the interference pattern through a two-dimensional array detector to produce a signal output;

converting the signal output to a phase change output using a Fourier transform program; and

determining the diffusion rate of the first analyte into the first polymer from the phase change.

15. The method of Claim 14, wherein the first beam of light and the second beam of light result from beam splitting a light beam from a laser beam source.

16. The method of Claim 14, wherein the apparatus used to measure the diffusion rate of the first analyte into the first polymer comprises:

a laser beam source;

optional beam splitting means for producing at least two beams of light from a single incoming beam of light;

an optical waveguide interferometer;

a test sample region of the optical waveguide interferometer;

a reference sample region of the optical waveguide interferometer;

a lens for combining (i) a sensing beam of light exiting the test sample region of the optical waveguide interferometer with (ii) a reference beam of light exiting a reference sample region of the optical waveguide interferometer;

an optional microscope objective for producing an interference pattern of alternating dark and light fringes from (i) a first propagating light speed of the sensing beam of light and (ii) a second propagating light speed of the reference beam of light;

a two-dimensional array detector for imaging the interference pattern and producing a signal output; and

a Fourier transform program for converting the signal output to a phase change output.